

WHAT IS CLAIMED:

- 1 1. A process for producing a silane-crosslinked thermoplastic polymer
2 comprising:
3 a) providing a mixture of:
4 (i) at least one silane possessing an unsaturated organic function;
5 (ii) at least two free radical initiators, the first initiator having a first half-
6 life temperature and the second initiator having a second half-life
7 temperature being higher than said first half-life temperature;
8 (iii) at least one thermoplastic polymer; and,
9 b) reacting the mixture of step (a) under reactive mechanical-working
10 conditions and exposure to moisture to provide crosslinked polyolefin.

- 1 2. The process of Claim 1 wherein the thermoplastic polymer is at least one
2 polyolefin selected from the group consisting of high-pressure low-density polyethylene,
3 medium/low-pressure high-density polyethylene, low-pressure low-density polyethylene,
4 medium-density polyethylene, an ethylene- α -olefin copolymer, polypropylene, an
5 ethylene-ethyl acrylate copolymer, an ethylene-vinyl acetate copolymer, an ethylene-
6 propylene copolymer, an ethylene-propylene-diene terpolymer, an ethylene-butene
7 copolymer, polymethyl-pentene-1, polybutene, chlorinated polyethylene, an ethylene-
8 vinyl acetate-chlorine terpolymer, and the like, and mixtures thereof.

1 8. The process of Claim 1 wherein the 0.1 hour half-life temperatures
2 of the first free radical initiator is from about 90° to about 155°C.

1 9. The process of Claim 1 wherein the 0.1 hour half-life temperature
2 of the second free radical initiator is from about 125° to about 190°C.

1 10. The process of Claim 1 wherein the 0.1 hour half-life temperature
2 of the second free radical initiator is from about 140° to about 170°C.

1 11. The process of Claim 7 wherein the first free radical initiator is selected
2 from the group consisting of di (2,4-dichloro benzoyl) peroxide, tert-butyl
3 peroxypivalate, dilauroyl peroxide, dibenzoyl peroxide, tert-butyl peroxy-2-
4 ethylhexanoate, 1,1 di(tertbutylperoxy)-3,3,5-trimethylcyclohexane, di(tertbutylperoxy)
5 cyclohexane, tert-butyl peroxy-3,5,5-trimethylhexanoate, tert-butyl peroxyacetate, tert-
6 butylperoxybenzoate, di-tert-amyl peroxide, dicumyl peroxide, di(tert-
7 butylperoxyisopropyl)benzene and 2,5-dimethyl-2,5-di(tert-butylperoxy)hexane.

1 12. The process of Claim 9 wherein the second free radical initiator is selected
2 from the group consisting of tert-butyl peroxyacetate, tert-butylperoxybenzoate, di-tert-
3 amyl peroxide, dicumyl peroxide, di(tert-butylperoxyisopropyl)benzene, 2,5-dimethyl-
4 2,5-di(tert-butylperoxy)hexane, tert-butyl cumyl peroxide, 2,5-dimethyl-2,5-di(tert-
5 butylperoxy)hexyne-3 and di-tertbutylperoxide.

1 13. The process of Claim 1 wherein mixture (a) further includes at least one
2 additional component selected from the group consisting of catalysts, stabilizers, fillers,
3 antioxidants, processing aids, oils, plasticizers, pigments and lubricants.

1 14. The crosslinked polyethylene produced by the process of Claim 1.

1 15. The crosslinked polyethylene produced by the process of Claim 2.

1 16. The crosslinked polyethylene produced by the process of Claim 3.

1 17. The crosslinked polyethylene produced by the process of Claim 4.

1 18. The crosslinked polyethylene produced by the process of Claim 5.

1 19. The crosslinked polyethylene produced by the process of Claim 6.

1 20. The crosslinked polyethylene produced by the process of Claim 7.

1 21. The crosslinked polyethylene produced by the process of Claim 8.

1 22. The crosslinked polyethylene produced by the process of Claim 9.

- 1 23. The crosslinked polyethylene produced by the process of Claim 10.
- 1 24. The crosslinked polyethylene produced by the process of Claim 11.
- 1 25. The crosslinked polyethylene produced by the process of Claim 12.
- 1 26. The crosslinked polyethylene produced by the process of Claim 13.
- 1 27. A composition comprising:
- 2 (i) at least one silane possessing an unsaturated organic function;
- 3 (ii) at least two free radical initiators, the first initiator having a first
- 4 half-life temperature and the second initiator having a second half-life temperature, said
- 5 second half-life temperature being higher than said first half-life temperature;
- 6 (iii) optionally one or more condensation catalysts;
- 7 (iv) optionally, one or more stabilizers, stabilizer packages, inhibitors
- 8 or free radical scavengers; and,
- 9 (v) optionally, other additives such as fillers, colorants, processing
- 10 aids, etc.